A New Species of *Pachycarpus* (Apocynaceae: Asclepiadoideae) from KwaZulu-Natal, South Africa

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Abstract. *Pachycarpus acidostelma* M. Glen & Nicholas (Apocynaceae, Asclepiadoideae) is a new species described from the KwaZulu-Natal Province of South Africa. The new taxon is differentiated from other closely related *Pachycarpus* E. Mey. species (*P. scaber* (Harv.) N. E. Br. and *P. asperifolius* Meisn.) by its small stature, the catilliform or saucer-shaped corolla, and a deltoid corona lobe that is sharp at the distal end, hence the specific epithet. It also differs from *P. asperifolius* in the inflorescence being terminal and subcorymbose.

Key words: Apocynaceae, Asclepiadoideae, IUCN Red List, *Pachycarpus*, South Africa.

During recent fieldwork undertaken at Highflats in the South African province of KwaZulu-Natal, one of the authors (Shuttleworth) collected two specimens of *Pachycarpus* E. Mey. that could not be placed into any previously known species of this genus. Preliminary assessments of these collections suggested that they may be allied to *P. asperifolius* Meisn. or *P. scaber* (Harv.) N. E. Br. Analyses of morphological data, however, suggest that the Highflats population is a distinct entity, more similar to *P. scaber* than to *P. asperifolius* (Figs. 1, 2). Although the distributions of all three species are sympatric at a provincial level, neither *P. scaber* nor *P. asperifolius* have yet been seen or collected in or near the vicinity of the new species. Based on these findings, it was decided that the Highflats *Pachycarpus* population, although of restricted distribution, is deserving of recognition at species level.

The genus *Pachycarpus* (Apocynaceae, Asclepiadoideae) was taxonomically recognized by N. E. Brown (1902, 1908) and currently comprises 44 taxa throughout Africa (Goyder, 1998). Thirty of these taxa occur in southern Africa, 90% of which are endemic to this region (Smith, 1988). Excluding the taxa within section *Trichocodon* D. M. N. Sm. (Smith, 1988), the rest of the genus is morphologically well correlated in southern Africa with many common correlated diagnostic characters (Nicholas, 1999). These include deep-seated, cylindrical rootstock, stout stems with a large pith, broad leaves, inflorescences lateral at the nodes, rarely terminal, stout peduncles (when present), flowers not causing the stems to droop, smooth carpels, and fruits that are leathery and inflated in many species.

Pachycarpus acidostelma M. Glen & Nicholas, sp. nov. TYPE: South Africa. KwaZulu-Natal Prov.: Ixopo Distr., 1 km SSE from Highflats, 3 Dec. 2007, *A. Shuttleworth 38* (holotype, NU; isotype, MO). Figures 1A, C, 3.

Haec species *Pachycarpo scabro* (Harv.) N. E. Br. et *P. asperifolio* Meisn. affinis, sed a hoc inflorescentia corymbosa subcorymbosave atque columna staminali plerumque breviore, ab ambobus statura humiliore, corolla juveni catilliformi atque coronae lobo distaliter deltoideo acuto differt.

Habit erect, perennial geophytic herb with milky latex. Rootstock deep-seated, narrow, cylindrical caudex. Stems mostly solitary, 37–40 cm tall, slightly scabrid. Leaves oval, oblong and wide, 3.8–7.9 × 2–3.4 cm; apex obtuse or rounded with slight mucronate point; base shortly attenuate, rounded; margin thickened, callose and sparsely ciliate, occasionally almost revolute; vestiture glabrous, with the abaxial midrib hispid; venation prominent on the underside; petioles 3–6.5 mm. Inflorescences terminal and extra-axillary, 4 per stem, corymbose or subcorymbose; 4- to 6-flowered; peduncles free, 11–29 mm; pedicels pubescent, 15–21 mm. Flowers pale cream to pale yellow, sweetly scented, 13–17 × 23–25 mm; sepals reflexed, scabrid, 7.5–9 × 3.5–6.5 mm; corolla cream, spreading and catilliform when young, tips reflexed when mature; lobes ovate, ca. 9–12 × 9 mm; gynostegial column 3.9–4.8 mm tall; corona cream, tinged yellow at base; lobes spreading 1.4–3.2 × 1.7–2.4 mm, 2.5–2.7 mm tall, proximal end broad with two curved, erect, contiguous, dentate appendages,

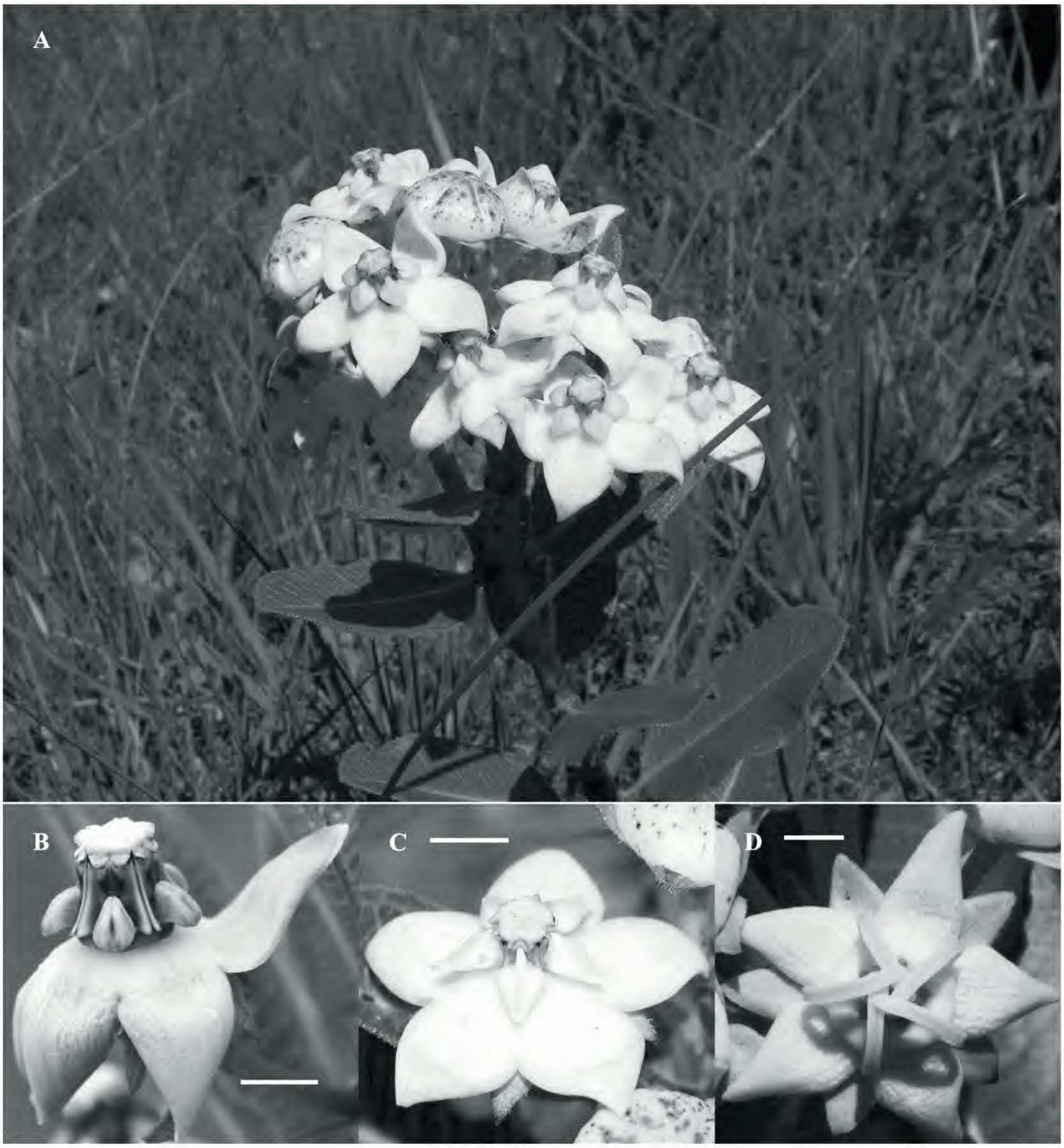

Figure 1. —A. *Pachycarpus acidostelma* M. Glen & Nicholas. Flowering branch (photo by A. Shuttleworth [from the type population, but not of type specimen]). —B. *P. asperifolius* Meisn. Flower with tall staminal columns and smaller corona lobes (photo by P. Wragg). —C. *P. acidostelma*. Flower with deltoid corona lobes (photo by A. Shuttleworth [not of type specimen]). —D. *P. scaber* (Harv.) N. E. Br. Flower with long corona lobe appendages (photo by M. Glen [*M. Glen & W. Froneman 106*, UDW]). B–D scale bars = 5 mm.

broadening distally into a sharp deltoid point (2–2.7 × 0.7–1.9 mm) with sharp apex, a shallow groove running along the upper surface and between the proximal appendages; androecium, with the anther appendages oblong with acute apex, ca. 2 × 1.7–2 mm; anther wings moderately prominent, 2.4–3.4 × 1–1.4 mm; pollinarium, with the corpusculum ca. 0.75–0.85 × 0.45 mm; translator arm narrowly winged, 0.9–1.4 mm; pollinium dorsoventrally flattened, oblong, 1.35–1.8 × 0.65–0.9 mm; gynoecium with style head 3.3–3.7 mm diam. Fruit a follicle, solitary, on bent pedicel, inflated, ovoid, ca. 90 × 34 mm, winged apically; apex angular; seeds not seen.

Etymology. The epithet for the new species refers to its sharply pointed corona lobes.

Distribution and habitat. *Pachycarpus acidostelma* is only known from one locality near Highflats in KwaZulu-Natal. It grows in midland grasslands at an altitude of between 960 and 976 m.s.m.

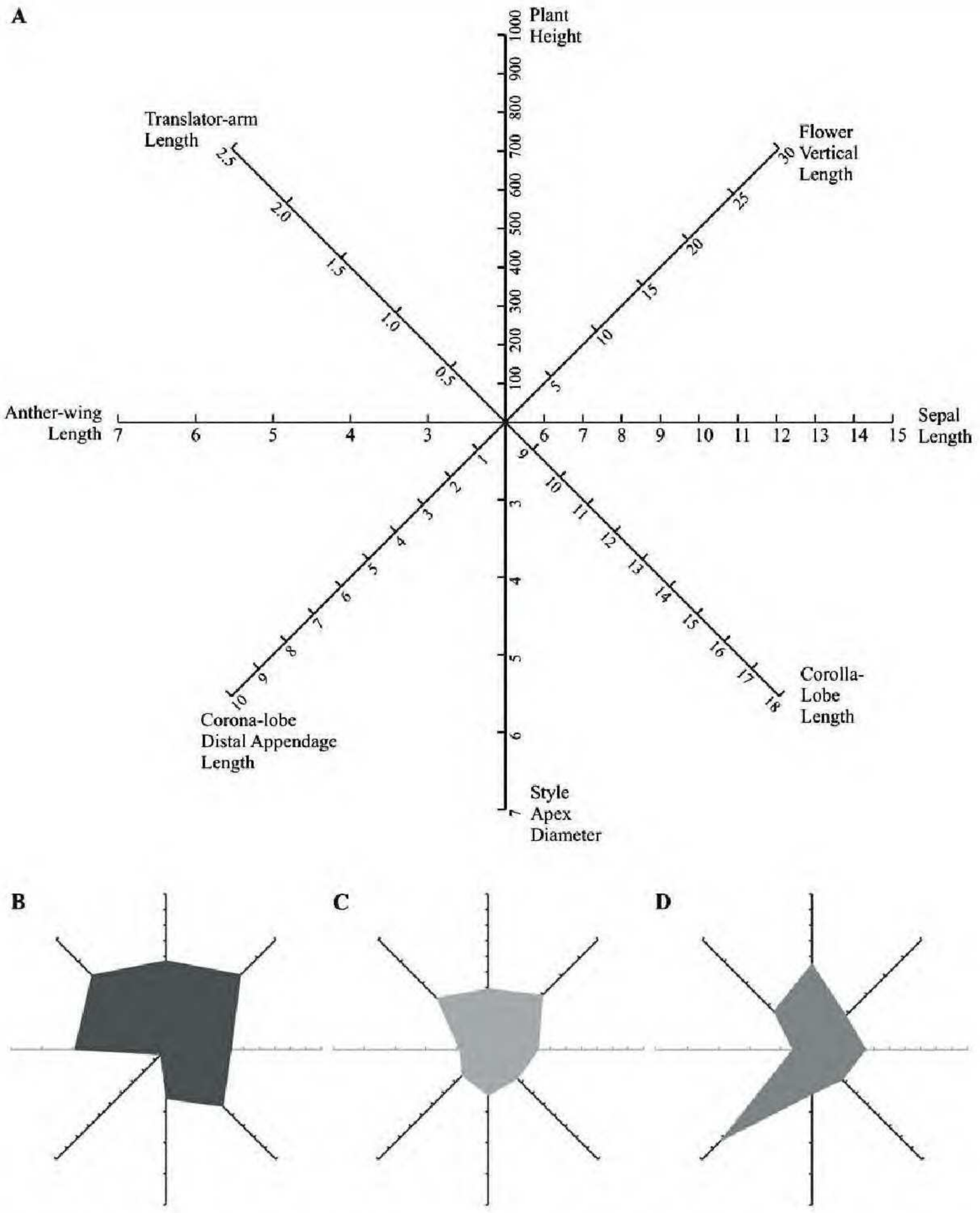

Figure 2. —A. Eight-dimensional polygonal graph illustrating relationships among plant height, flower vertical length, sepal length, corolla lobe length, style apex diameter, distal corona lobe appendage length, anther wing length, and translator arm length. Mapped morphological states (mm) for B, *Pachycarpus asperifolius*; C, *P. acidostelma*; and D, *P. scaber*. Specimens from which data were collected: ***P. asperifolius*:** *A. Abbott 703* (NH), *A. & G. Hutchings & E. Plumstead 2054* (NH), *A. M. Ngwenya 458* (NH), *N. Nombekela 458* (NH), *D. Harriss 50*, *77*, and *112* (NU), *J. L. Gordon-Gray 1003* (NU), *K. Balkwill & M.-J. Cadman 2139* (NU), *R. G. Strey 6151* (NU), *T. Edwards 354* (NU), *A. Nicholas, L. Smook & E. Harrison 2352* (PRE), *E. E. Galpin 3195* and *3445* (PRE), *R. G. Strey 9304* (PRE), *C. J. Ward 6380*, *6380a*, and *12800* (UDW), *E. Hennessy 214* (UDW), *J. E. Rzepecke 89a* and *89c* (UDW). ***P. scaber*:** *A. Nicholas & N. van den Berg 1762* (NH), *D. Green 475* (NH), *G. Thorncroft 433* (NH), *J. M. Wood 448* (NH), *R. H. Compton 31773* (NH), *T. R. Greene 816* (NH), *M. L. Jacobsz 1774* (PRE), *R. Pott 4897* (PRE), *S. P. Bester 3909* (PRE), *S. R. Hobson 2161* (PRE), *N. L. Meyer 110* (PRU). ***P. acidostelma*:** *A. Shuttleworth 38* and *39* (NU), *N. E. Shirley 328* (NU).

Ecology. *Pachycarpus acidostelma* is known from a single locality in KwaZulu-Natal sandstone sourveld (vegetation classification sensu Mucina & Rutherford, 2006). The limited floral visitor observations conducted to date suggest that *P. acidostelma* is specialized for pollination by the chafer beetle *Atrichelaphinis tigrina* (Olivier, 1789) and attaches pollinaria to the tarsi of these beetles (Shuttleworth & Johnson, 2009). Flowers were also visited by various flies, although these were not observed to carry pollinaria and are unlikely to contribute to pollination (Shuttleworth & Johnson, 2009). The flowers of this species have a faint, sweet scent to the human nose. Chemical analysis showed the scent to be dominated by aliphatic compounds and common floral monoterpenes such as linalool, (E)- and (Z)-ocimene, limonene, and myrcene, several of which are also produced by other chafer-pollinated asclepiads (Shuttleworth & Johnson, 2010). A more in-depth study of this species' pollinator requirements and breeding system is essential for long-term conservation planning measures.

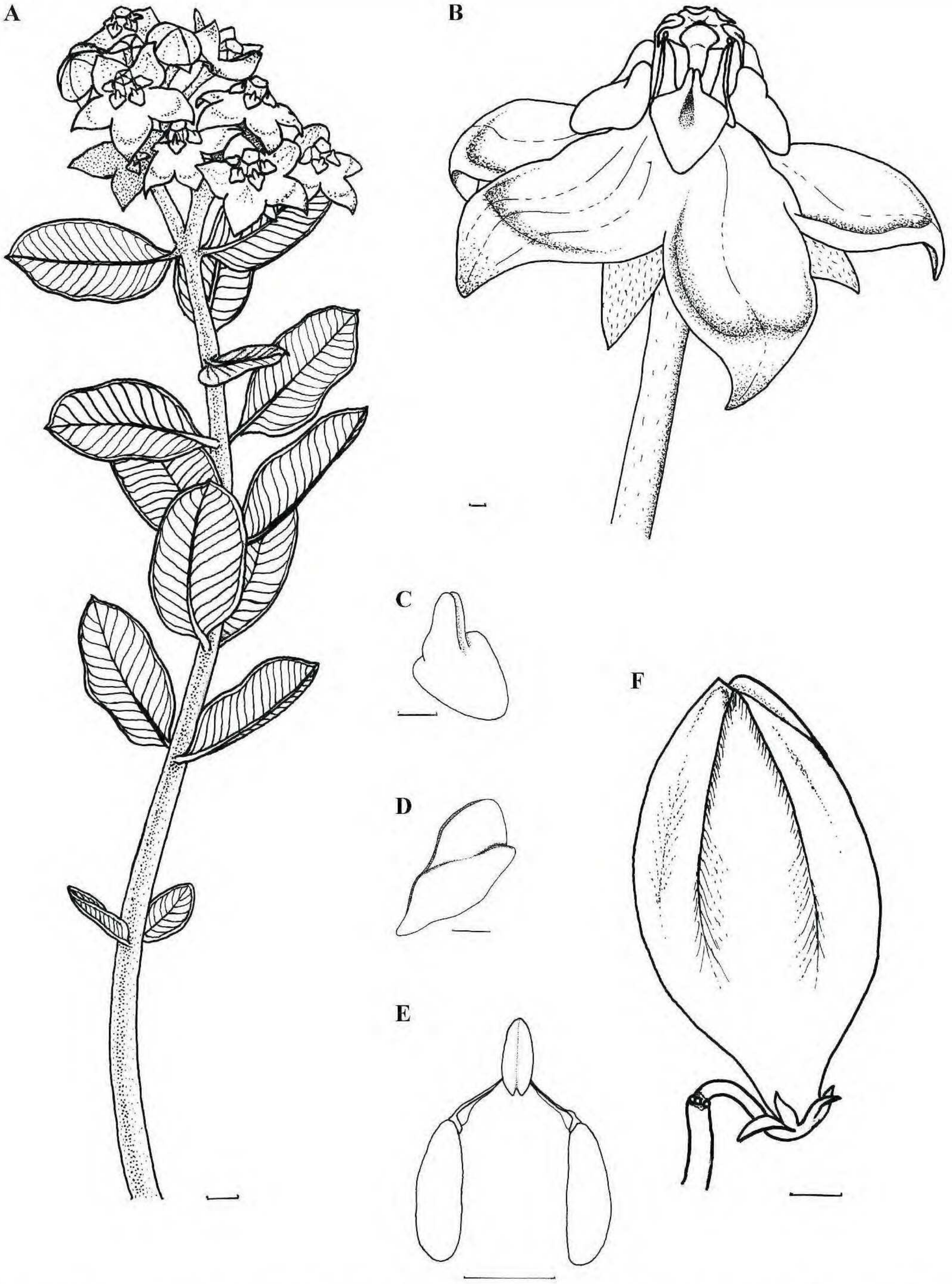

Figure 3. *Pachycarpus acidostelma* M. Glen & Nicholas. —A. Flowering stem. —B. Lateral view of intact flower. —C. Oblique view of corona lobes. —D. Lateral view of corona lobes. —E. Pollinarium. —F. Fruit. Scale bars: A, F = 1 cm; B–E = 1 mm. Drawn by M. Glen from *A. Shuttleworth 38* and *39* (NU) and *N. E. Shirley 328* (NU).

IUCN Red List category. *Pachycarpus acidostelma* is considered a Critically Endangered taxon, according to IUCN (2001) criteria (CR B2ab(iii); D). This species is only known from one population containing ca. 40 mature individuals. It is extremely restricted in distribution (< 10 km^2), surrounded by extensive farming and increasing human populations. The future conservation of this species relies

Table 1. Comparison between different diagnostic morphological characters for *Pachycarpus acidostelma*, *P. asperifolius*, and *P. scaber*.

Species	*P. acidostelma*	*P. asperifolius*	*P. scaber*
Average plant height (cm)	39	57	55
Leaf shape	broadly oblong	elliptic	ovate
Leaf apex	obtuse with mucronate point	acute-acuminate	rounded-abruptly acute
Inflorescence type	subcorymbose	racemose	corymbose
Flower color	pale cream to pale yellow	pale green with mauve	cream-pale yellow
Corolla shape	catilliform	reflexed	spreading
Corona lobe shape	deltoid	globular	with filiform distal appendage that is connivent over stigma-style apex
Corona lobes proximal, lateral auricles presence	absent	absent	present
Average gynostegial column height (mm)	4.35	6.65	4.61
Follicle shape	ovoid and winged apically	ellipsoid and winged longitudinally	globose and shallowly winged longitudinally

on its official recognition and inclusion on Red Data lists.

Discussion. The corona lobes of *Pachycarpus acidostelma* are somewhat similar in structure to those of *P. asperifolius*, with the result that one specimen (*Shirley 328*, NU) has previously been erroneously named and filed under this latter species. *Pachycarpus acidostelma* differs from *P. asperifolius* and *P. scaber* in a number of important morphological traits (Table 1, Fig. 1).

Key to *Pachycarpus acidostelma* and Allies in South Africa

1a. Inflorescences racemose; flowers at different heights along flowering stem; staminal column 5–13.5 mm tall ..... *P. asperifolius*
1b. Inflorescences corymbose or subcorymbose, flowers held at almost the same level at or near the terminus of the flowering stem; staminal column 2.3–7.5 mm tall 2
2a. Distal corona lobe with filiform appendage 5.6–10.5 mm long, recurving and connivent over the style-stigma head ..... *P. scaber*
2b. Distal corona lobe without an appendage, the lobe tapering horizontally to a sharp deltoid point ..... *P. acidostelma*

Paratypes. SOUTH AFRICA. **KwaZulu-Natal:** Highflats, 20 Oct. 1964, *N. E. Shirley 328* (NU); 17 Jan. 2008, *A. Shuttleworth 39* (NU, PRE).

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